

WE CLAIM:

1. A method of fabricating a Magnetic Random Access Memory (MRAM) comprising:

forming an array of magneto-resistive bits such that the magneto-resistive bits are further arranged in a plurality of rows, where a major axis of a magneto-resistive bit is offset from a row to which it corresponds;

forming a plurality of digital lines such that a digital line is adjacent to a row of magneto-resistive bits such that the digital line is offset from the major axes of the magneto-resistive bits in the row;

forming a plurality of word lines such that a word line crosses a digital line but is not perpendicular to the digital line, where the word line is substantially perpendicular to the major axes of adjacent magneto-resistive bits; and

forming a plurality of sense lines, where a sense line electrically connects magneto-resistive bits of a row.

2. The method as defined in Claim 1, further comprising forming the plurality of word lines such that word lines are substantially parallel to each other.

3. The method as defined in Claim 1, further comprising forming the plurality of sense lines such that portions of sense lines disposed between magneto-resistive bits are non-magnetic.

4. A method of storing data in a Magnetic Random Access Memory (MRAM) comprising:

receiving an address corresponding to a memory location of the MRAM, where the MRAM includes a plurality of magneto-resistive bits in an array, a plurality of word lines, and a plurality of digital lines, where the magneto-resistive bits are further arranged in a plurality of rows, where a major axis of a magneto-resistive bit is offset from a row to which it corresponds, where a digital line is adjacent to a row of magneto-resistive bits such that the digital line is offset from the major axes of the magneto-resistive bits in the row, where a word line crosses a digital line but is not perpendicular to the digital line, where the word line is substantially perpendicular to the major axes of adjacent magneto-resistive bits;

receiving data to be stored in the MRAM;

receiving a control signal that indicates a data write operation;
relating the address to a word line and a digital line corresponding to a magneto-resistive bit in the array; and
storing a first logical state by activating word line current in the selected word line and by activating digital line current in the selected digital line in response to the control signal.

5. The method as defined in Claim 4, further comprising storing a second logical state by activating word line current in the selected word line and by activating digital line current in the selected digital line in response to the control signal, where a direction of flow of current used for the second logical state is opposite to than a direction for the first logical state.

6. The method as defined in Claim 4, further comprising:
selecting a sense line corresponding to the selected magneto-resistive bit; and
activating current in the selected sense line, where the sense line current flows in a first direction along the sense line to store the first logical state, and where the sense line current flows in a second direction opposite to the first direction to store a second logical state.

7. The method as defined in Claim 4, wherein the word lines are substantially parallel to each other.

8. A method of retrieving data stored in a Magnetic Random Access Memory (MRAM) comprising:

receiving an address corresponding to a memory location of the MRAM, where the MRAM includes a plurality of magneto-resistive bits in an array, a plurality of word lines, and a plurality of digital lines, where the magneto-resistive bits are further arranged in a plurality of rows, where a major axis of a magneto-resistive bit is offset from a row to which it corresponds, where a digital line is adjacent to a row of magneto-resistive bits such that the digital line is offset from the major axes of the magneto-resistive bits in the row, where a word line crosses a digital line but is not perpendicular to the word line, where the word line is substantially perpendicular to the major axes of adjacent magneto-resistive bits;

receiving a control signal that indicates a data read operation;

relating the address to a word line, a digital line, and a sense line corresponding to a magneto-resistive bit;

activating current to pass through the selected word line in a first word line direction;

activating current to pass through the selected digital line in a first digital line direction;

sensing a first resistance of the sense line;

activating current to pass through the selected word line in a second word line direction;

activating current to pass through the selected digital line in a second digital line direction;

sensing a second resistance of the sense line; and

comparing the first resistance to the second resistance to retrieve the stored data.

9. The method as defined in Claim 8, wherein the word lines are substantially parallel to each other.